

Integrating the semantics of events, processes and tasks across requirements engineering layers



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1. Introduction

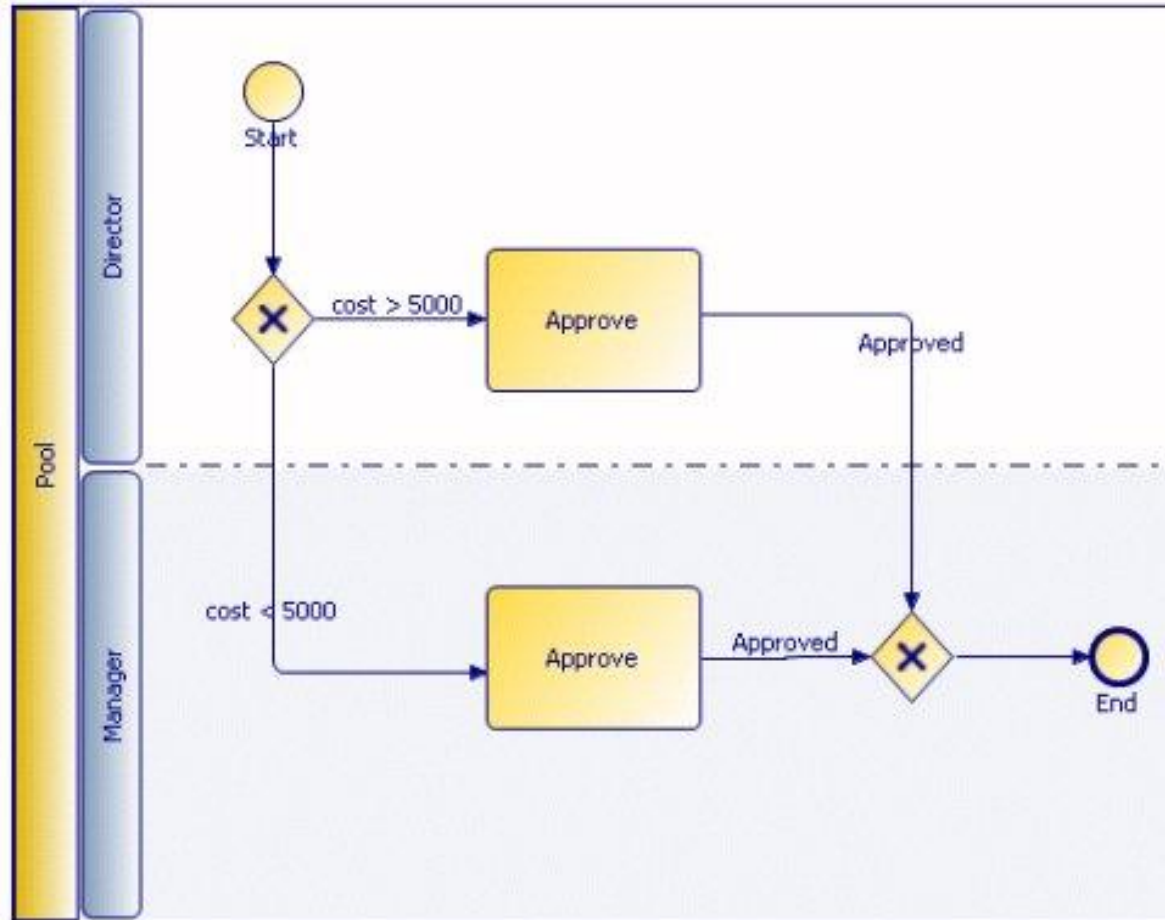
- Flexibility, adaptability and cost effectiveness of software can be significantly improved if an event-based architecture is applied
- Goal: develop loosely-coupled systems
- Problem: “event”: different interpretations in modeling techniques and languages



1. Introduction

- ◎ **Aim of this PhD**: analyse several modeling techniques and languages used on different levels in software engineering according to their use of the concept of event
 1. Ontological analysis (using upper level ontologies) of the concept of event
 2. Development of a meta-model
 3. Extend the meta-model with a manual to ease the use of this meta-model

1. Example of BPMN: EVENT?



1. Introduction

Ontological
Analysis

Meaning of event in
UFO and BWW

Result of
ontological
analysis

2 sets of dimensions
from UFO and BWW

Goal of this
ontological
analysis

Evaluate several
modeling
techniques and
languages

2. Ontological Analysis

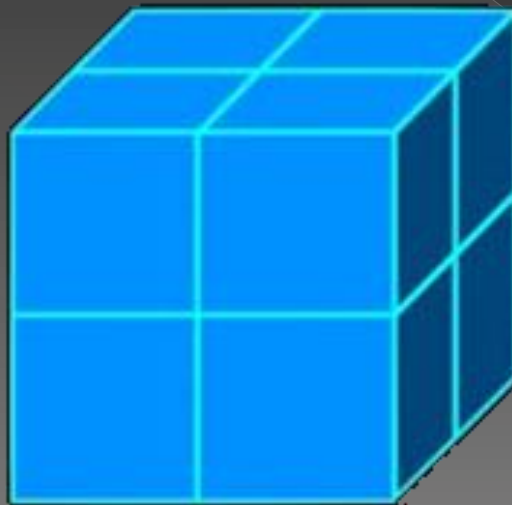


2. Ontological Analysis

- “Ontologies are explicit specifications of a conceptualization” (Gruber, 1993)
- Ontological analysis of the concept of **event**

3. Results

- Look at **UFO** and **BWW** to discover the meaning of the concept of event
- Three orthogonal dimensions found in UFO and in BWW



Ontological Analysis

Meaning of event in
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3.1 UFO

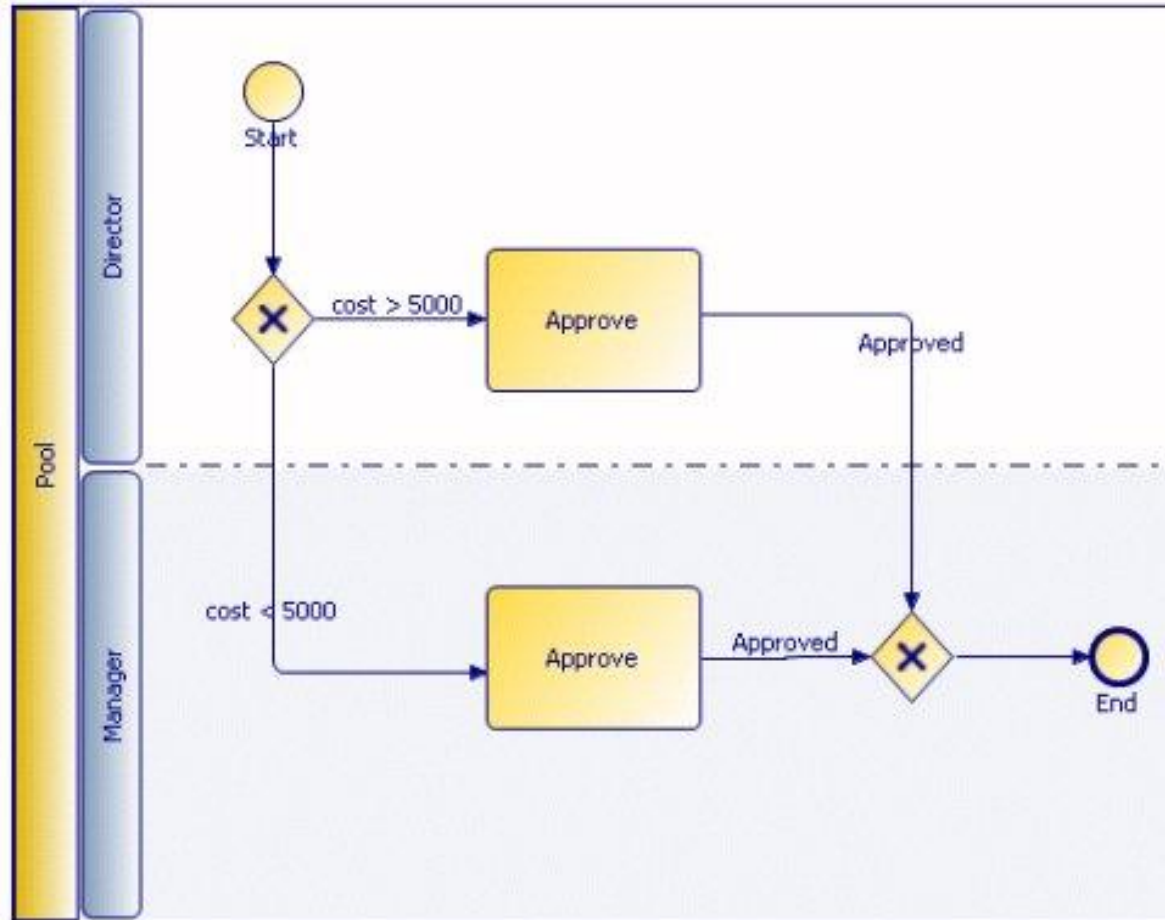
1. Atomic event – Complex event
2. Instantaneous event – Time-extended event
3. Action event – Non-action event

3.1 UFO

1. Atomic event – Complex event

- ⦿ *Atomic event*: no improper parts
- ⦿ *Complex event*: aggregation of at least two events (atomic or complex)
- ⦿ *Process*: special type of a complex event, sequence of two or more atomic events

Example of BPMN: EVENT?

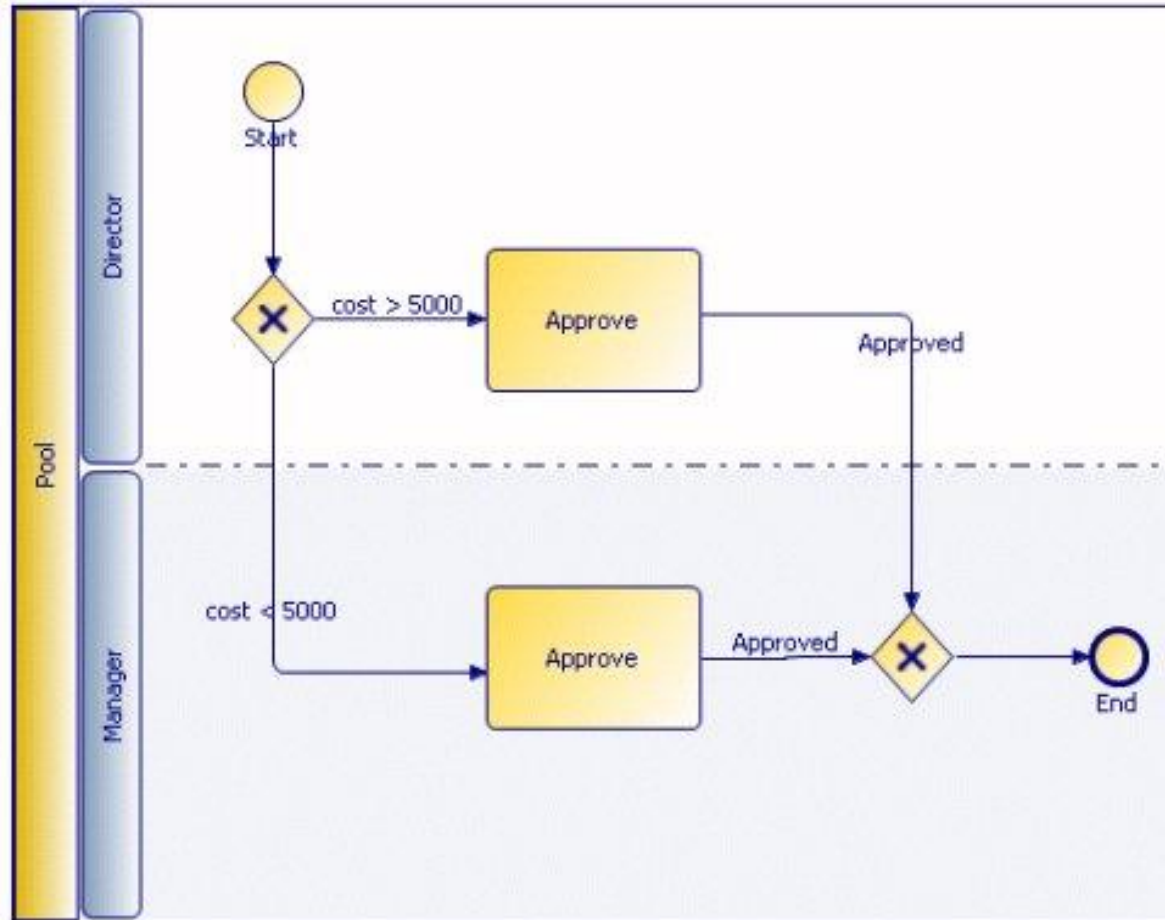


3.1 UFO

2. **Instantaneous event – Time-extended event**

- ⦿ *Instantaneous event*: without duration
- ⦿ *Time-extended event*: a time duration involved

Example of BPMN: EVENT?

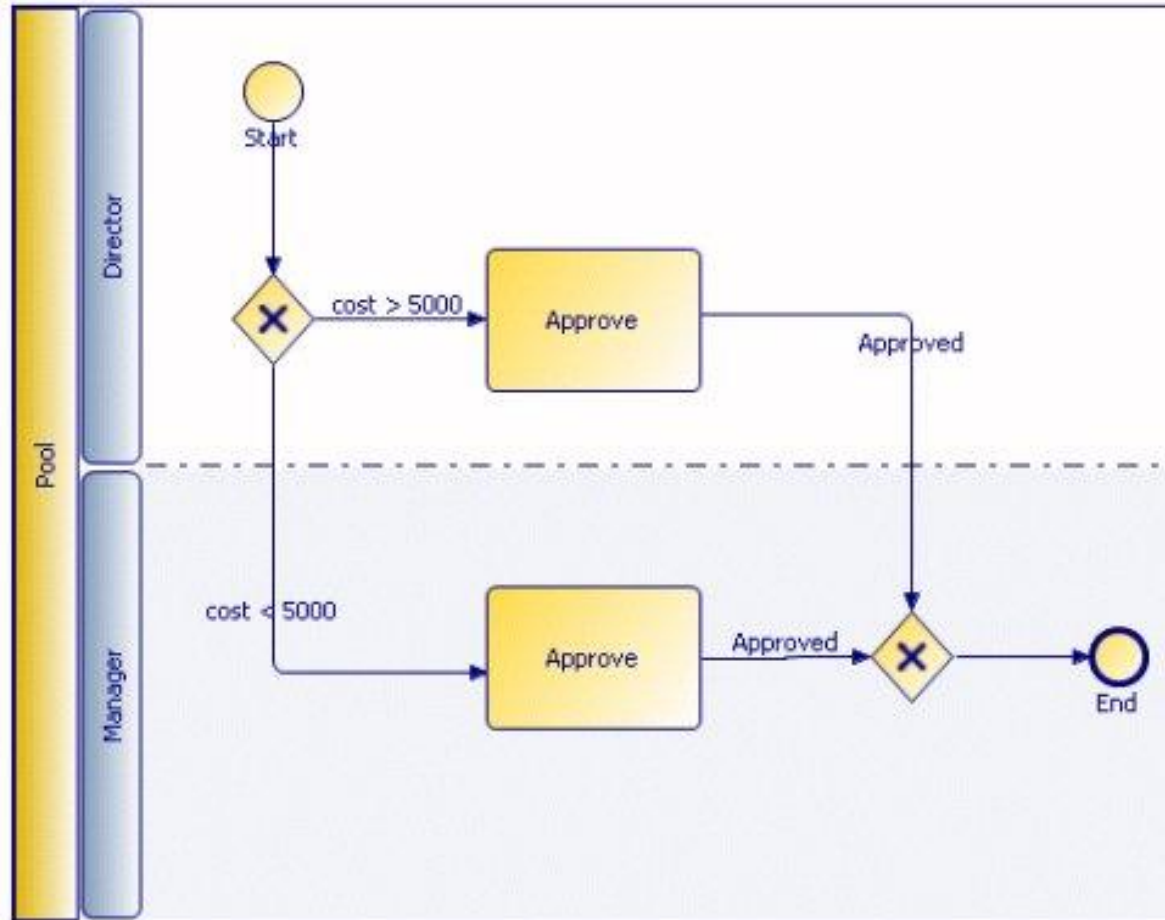


3.1 UFO

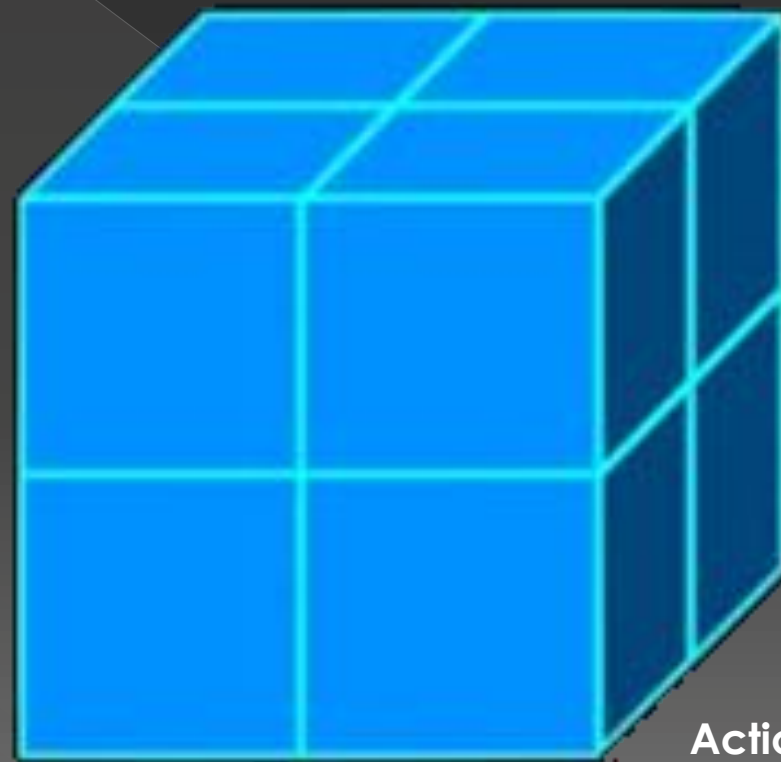
3. Action event – Non-action event

- ⦿ *Action event*: created through an action of a physical agent
- ⦿ *Non-action event*: not created through an action of a physical agent
- ⦿ *Physical agent*: physical object that creates action events affecting other physical objects, that perceives events and to which we can ascribe a mental state

Example of BPMN: EVENT?



Three orthogonal dimensions of Events (UFO)



Time-extended event

Non-action event

Instantaneous event

Action event

Atomic event

Complex event

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3.2. BWW

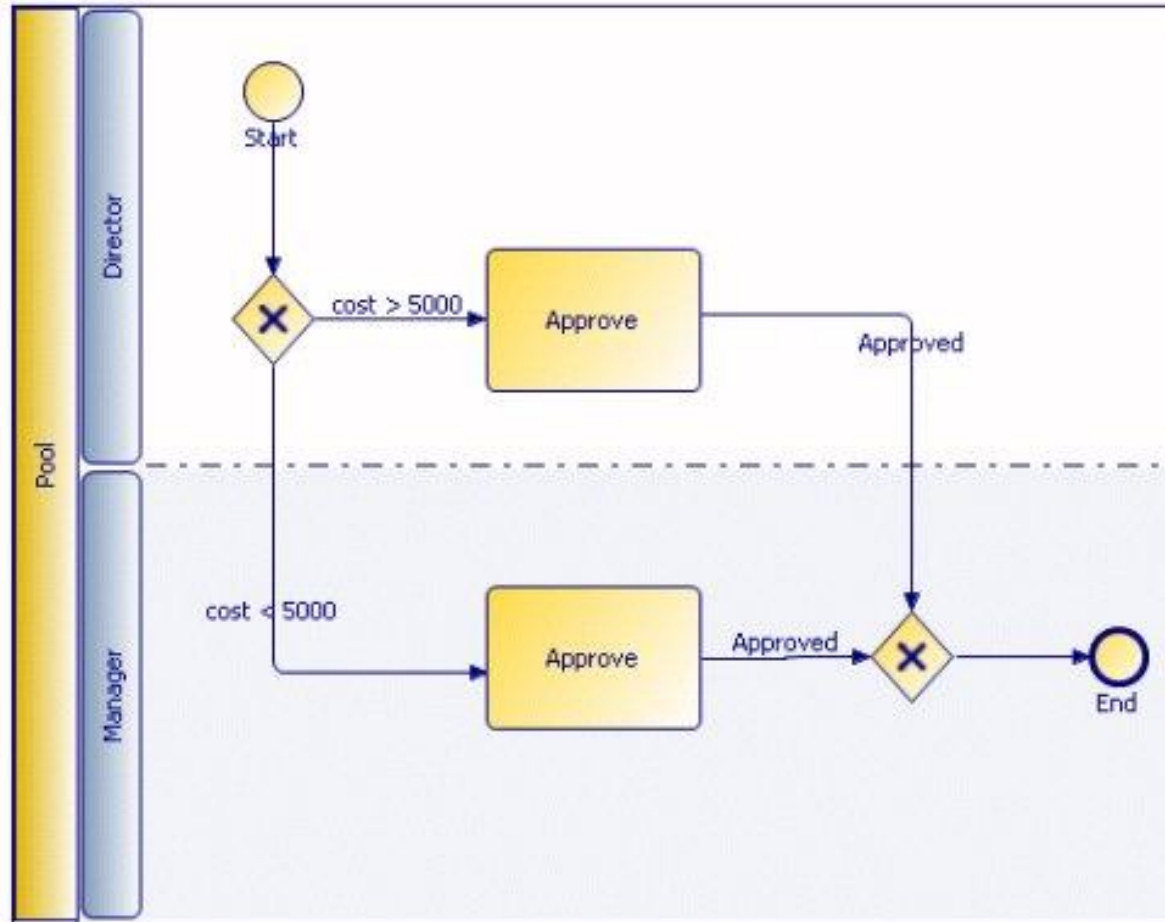
1. Event – Process
2. Internal event – External event
3. Well-defined event – Poorly-defined event

3.2. BWW

1. Event – Process

- ⦿ *Event*: a change of state of a thing. Is effected via a transformation
- ⦿ *Process*: an intrinsically ordered sequence of events on, or states of, a thing. Processes are either chains or trees of events

Example of BPMN: EVENT?



3.2. BWW

2. Internal event – External event

- *Internal event*: arises in a thing, subsystem, or system by virtue of lawful transformations in the thing, subsystem or system. The before-state of an internal event is always unstable. The after-state may be stable or unstable

3.2. BWW

2. Internal event – External event

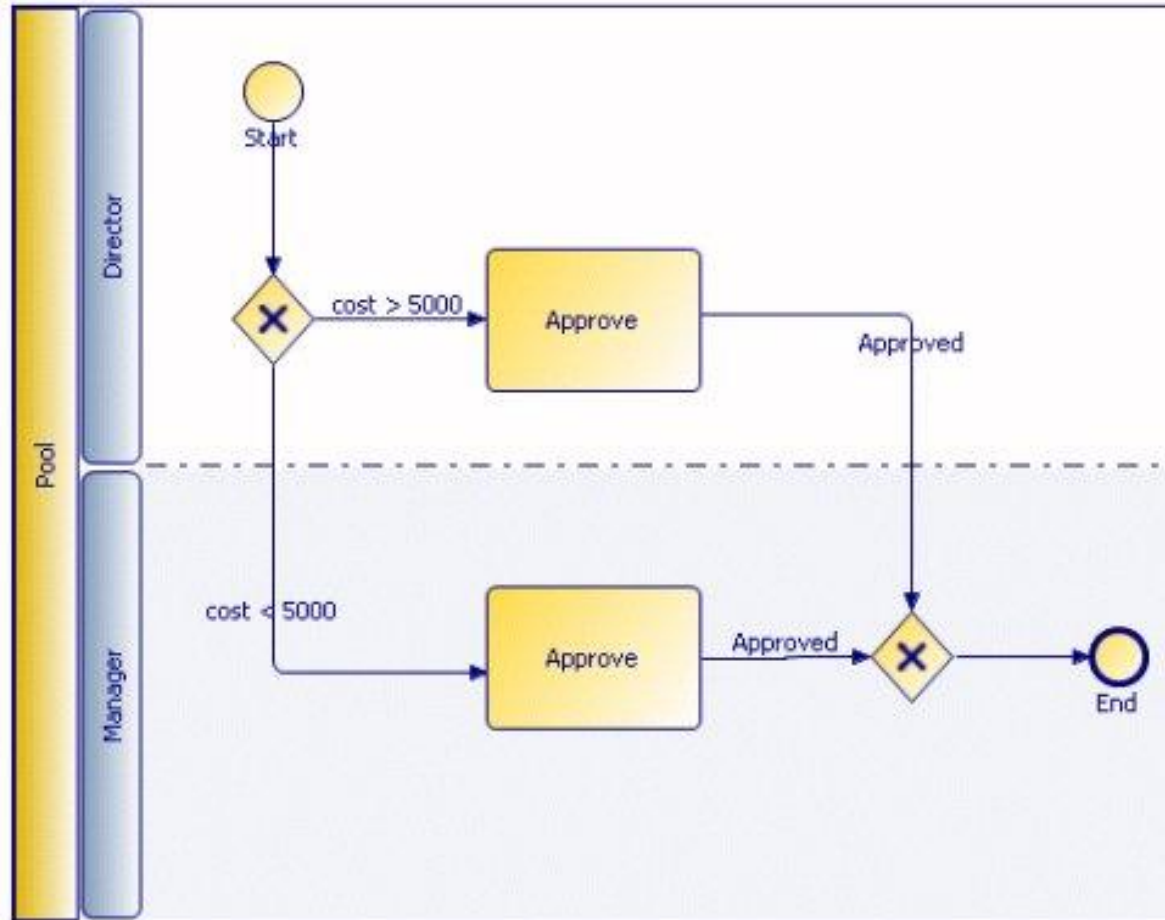
- External event: arises in a thing, subsystem, or system by virtue of the action of some thing in the environment of the thing, subsystem or system. The before-state of an external event is always stable. The after-state may be stable or unstable

3.2. BWW

2. Internal event – External event

- *Stable-state*: in which a thing, subsystem or system will remain unless forced to change by virtue of the action of a thing in the environment (an external event)
- *Unstable-state*: will be changed into another state by virtue of the action of transformation in the system

Example of BPMN: EVENT?

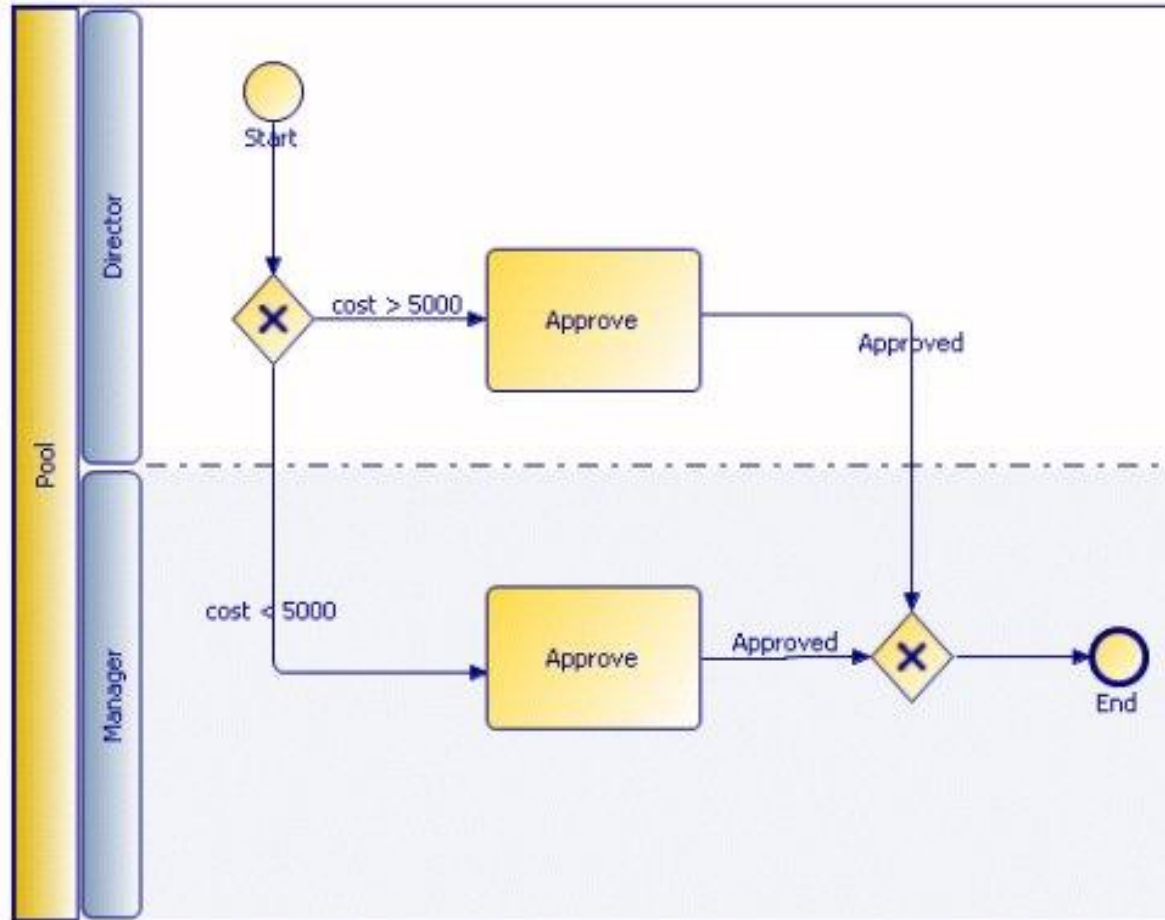


3.2. BWW

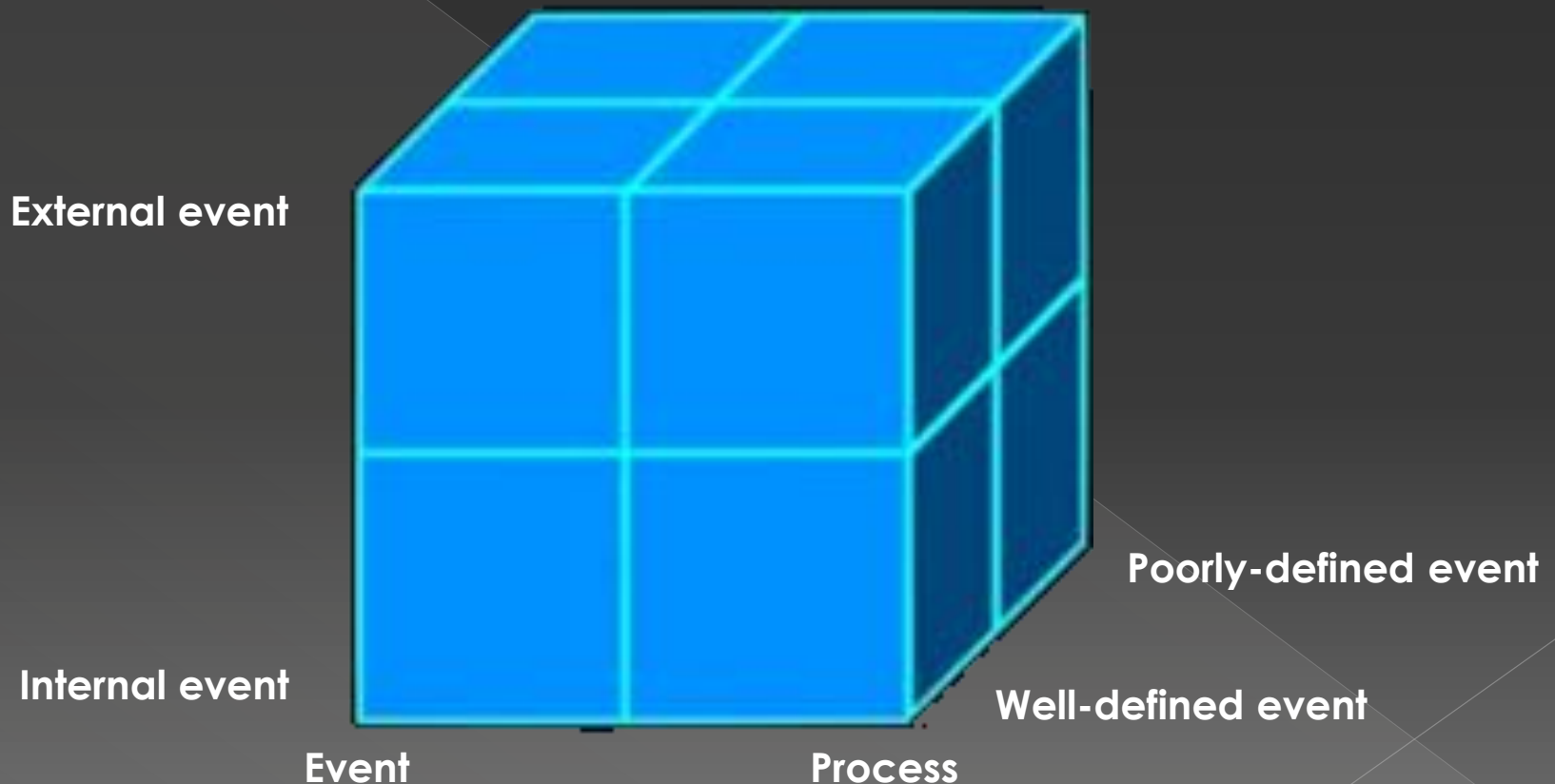
3. Well-defined event – Poorly-defined event

- *Well-defined event*: in which the subsequent state can always be predicted given that the prior state is known
- *Poorly-defined event*: in which the subsequent state cannot be predicted given that the prior state is known

Example of BPMN: EVENT?



Three orthogonal dimensions of Events (BWW)



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4. Future research

- Investigate several modeling techniques and languages according to their use of the concept event
- Make a mapping of these different modeling techniques and languages in the dimensions found in UFO and BWB
- Start with BPMN

5. Questions?

